National estimates of non-fatal firearm related injuries other than gunshot wounds

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Abstract

Objective—To characterize non-fatal firearm related injuries other than gunshot wounds (non-GSWs) treated in hospital emergency departments in the United States that occur during routine gun handling and recreational use as well as violence related use of a firearm.

Methods—Cases were identified through the National Electronic Injury Surveillance System (NEISS). During the study period, 1 January 1993 through 31 December 1996, NEISS consisted of a nationally representative sample of 91 hospitals in the United States having at least six beds and providing 24 hour emergency services.

Results—An estimated 65 374, or an average of 16 300 per year, non-fatal, non-GSWs were treated in American hospital emergency departments during the four year study period. Fifty seven per cent of all the non-fatal, non-GSWs were violence related, most of which involved being struck by a firearm. The majority of unintentional non-fatal, non-GSWs were self inflicted and occurred during routine gun handling or recreational use of a firearm; 43% of these injuries resulted from gun recoils.

Conclusions—Non-fatal, non-GSWs make a notable contribution to the public health burden of firearm related injuries. Firearm related injury prevention programs should focus on not only the reduction of gunshot wounds but also the reduction of unintentional and violence related non-GSWs.

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Fatal and non-fatal firearm related injuries associated with gunshot wounds (GSWs) have been extensively described in the medical literature. Since 1993, both fatal and non-fatal firearm related GSW injury rates have declined substantially, possibly due to improved economic conditions, the aging of the population, and changes in legislation, sentencing, and law enforcement practices.[1–3] However, GSWs remain an important public health problem. They were the second leading cause of injury death (32 400 deaths) behind motor vehicle traffic related death (42 500 deaths) in 1997.[4] In addition, GSWs contributed an estimated 64 200 non-fatal injuries treated in hospital emergency departments in the United States in 1997, about half of which required hospitalization.[3 4] Although suicides and homicides account for over 96% of all gunshot related deaths, about 20% of gunshot related injuries treated in hospital emergency departments in the United States are unintentional.[4–7]

Preventable firearm related injuries other than GSWs (subsequently referred to as "non-GSWs") are also a public health concern. They occur in a variety of circumstances, including fights, arguments, routine gun handling (for example, transporting, cleaning, repairing), recreational gun use, and leisure time activities. Findings from one study of violence related injuries suggested that one out of five violence related firearm injuries treated in American hospital emergency departments is associated with being struck by a gun.[8] Only minimal data on unintentional non-GSWs have been reported in selected populations, such as those occurring during hunting or target shooting, cleaning and repairing firearms, playing with a gun, or gun malfunction and mishandling.[7 9–18] These studies focused mainly on the circumstances of unintentional firearm related injuries and fatalities, most involving GSWs, and none characterize non-fatal, non-GSWs in the context of all firearm related injuries.

In this study, we examine non-fatal, non-GSWs treated in hospital emergency departments in the United States. National estimates are presented by demographic characteristics of the injured person, type and location of wounds, hospitalization status, activity at the time of injury, mechanism of injury, and other circumstances of the injury incident. Firearm related injuries were defined as those associated with guns that use a powder charge to fire a projectile. A non-GSW was defined as physical injury (bodily harm), self inflicted or inflicted by another person, occurring (1) from being struck by a firearm or objects dislodged during discharge of a firearm, or (2) while evading gunfire; for example, fracture of ankle from falling while running from gunfire. These injuries can be violence related (for example, fractures from being purposely struck by a gun) or unintentional (for example, lacerations from gun recoil during recreational use). Fatal firearm related injuries are not included in this study because deaths associated with non-GSWs cannot be identified in mortality data.

Methods

These data were from the National Electronic Injury Surveillance System (NEISS) operated by the Consumer Product Safety Commission. NEISS consisted of a stratified probability sample of 91 hospitals having 24 hour

emergency service and at least six beds. These hospitals are categorized in four strata—small, medium, large, and very large—based on the annual number of emergency department visits. Both rural and urban hospitals in all geographic regions are represented. To obtain national estimates, each firearm related case was assigned a sample weight based on the inverse of the probability of selection. National estimates were then computed by summing the sample weights within the population group or characteristic of interest. The sampling frame, data collection protocol, and sensitivity of NEISS for identifying firearm related injuries have been described elsewhere.[19–21]

This study primarily focuses on non-fatal, non-GSW cases initially treated in NEISS hospital emergency departments between 1 January 1993 and 31 December 1996. Injuries associated with BB, pellet, and other air guns were excluded. Patients discharged alive from the NEISS hospital emergency department were defined as having non-fatal injuries; this definition is supported by previous studies that suggest most firearm related deaths occur before hospitalization.[5]

At each NEISS hospital, trained coders reviewed hospital emergency department records, emergency department logs, and trauma registries to identify all firearm related injuries.[21–23] Coders then abstracted data on the nature of the injury, characteristics of the injured patient, and circumstances of the incident. Data were obtained on age, sex, and race, primary body part affected, diagnosis, disposition at discharge from the emergency department, locale where injured, type of firearm used, and person causing the injury. The coder provided a short narrative about the injury event as described in the medical record.

During the four year study period, 1961 non-fatal, non-GSW cases were treated in NEISS hospital emergency departments. Among these cases, we excluded 361 that occurred during military training (for example, injured during military activities, Reserved Officers' Training Corps, and rifle corps training). Most of the military related cases were treated at the three military hospitals in NEISS. Military training related injuries were excluded because military personnel have a much greater exposure to firearms during training subjecting them to higher risk than the general public. Non-military training related cases (for example, assaults) treated at military hospitals were included. Two additional cases were excluded because patients sustained both GSWs and non-GSWs. National estimates were computed using weighted data for the remaining 1598 non-fatal, non-GSW cases treated in NEISS hospital emergency departments.

We constructed two additional variables—mechanism of injury and activity at time of injury—for this study. A coding scheme (available upon request) was developed to categorize cases by mechanism of injury and activity at time of injury using information in the narratives. The coding procedures were pilot tested on an independent sample of NEISS non-GSW cases. Each case was assigned a mechanism of injury and activity code by one researcher. Then, using the protocol, a second researcher systematically reviewed all narratives and assigned codes to corroborate the classification. Any discrepancies were discussed and the final decision agreed upon by both researchers.

Mechanism-of-injury categories were mutually exclusive and reflected how the person was injured. The coding scheme was modeled after guidelines to assign the *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) external causes of injury codes (E codes) as well as the "recommended framework for presenting injury mortality data".[24 25] If more than one mechanism was listed, the mechanism most consistent with the listed diagnosis and type of injury was coded. For instance, injuries resulting from being struck by or striking against a stationary or moving object included falling on a gun if the gun itself caused the injury. Injuries coded into the struck by/against category exclude those sustained by falling or stumbling while carrying a firearm, or by being struck by an explosive
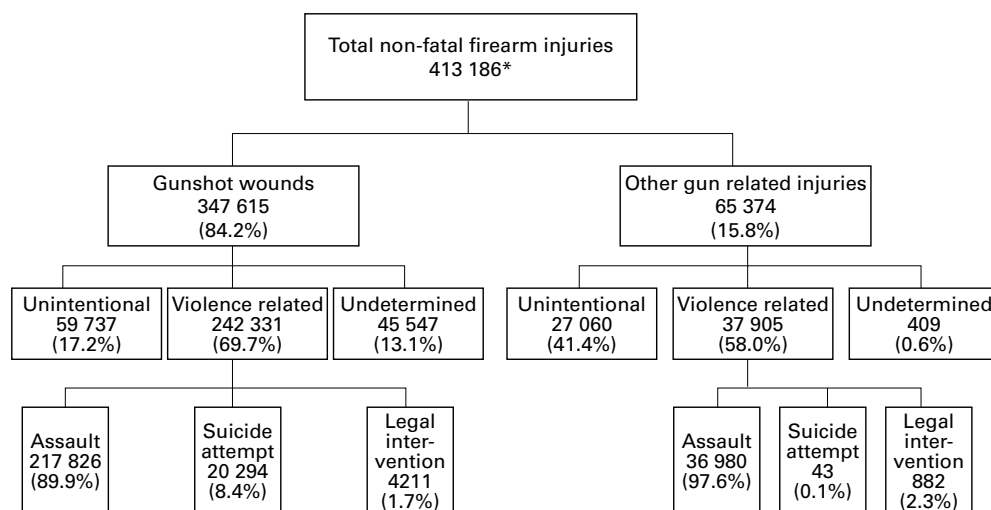

*Figure 1 National estimates of non-fatal firearm injuries treated in hospital emergency departments, by type and intent of injury: United States, 1993–96. *Includes an additonal 197 (0.05%) firearm injuries of undetermined type.*

Table 1 National estimates and rates per 100 000 population of non-fatal firearm related injuries* other than gunshot wounds treated in hospital emergency departments, by sex, race, age, and injury intent: United States, 1993–96

| | | | | Intent of injury | | | | | | | |
| | Total | | | Unintentional | | | | Assault | | | |
Characteristic	No (%)	Rate	95% CI	No (%)	Rate	95% CI		No (%)	Rate	95% CI	
Sex											
Male	52 658 (80.5)	10.3	8.4 to 12.3	23 223 (85.8)	4.5	3.6 to 5.5		28 371 (76.7)	5.6	3.9 to 7.2	
Female	12 716 (19.5)	2.4	1.8 to 3.0	3 837 (14.2)	0.7	0.5 to 0.9		8 609 (23.3)	1.6	1.1 to 2.1	
Race											
Non-Hispanic white	32 760 (50.1)	4.3	3.4 to 5.2	20 779 (76.8)	2.7	2.0 to 3.5		11 501 (31.1)	1.5	1.0 to 2.0	
Black	17 632 (27.0)	13.4	8.7 to 18.1	1 506 (5.6)	1.1	0.6 to 1.7		15 782 (42.7)	12.0	7.6 to 16.4	
Hispanic	4 940† (7.6)	4.7	1.5 to 7.8	223† (0.8)	0.2	−0.2 to 0.6‡		4 621† (12.5)	4.4	1.3 to 7.4	
Other/not stated	10 042 (15.4)	—	—	4 552 (16.8)	—	—		5 076 (13.7)	—	—	
Age (years)											
0–14	4 142 (6.3)	1.8	1.2 to 2.4	3 172 (11.7)	1.4	0.9 to 1.9		902 (2.4)	0.4	0.1 to 0.6	
15–24	20 411 (31.2)	14.1	10.8 to 17.5	5 905 (21.8)	4.1	2.9 to 5.3		14 069 (38.0)	9.7	6.9 to 12.6	
25–34	19 654 (30.1)	11.9	9.1 to 14.8	7 734 (28.6)	4.7	3.5 to 5.9		11 576 (31.3)	7.0	4.7 to 9.4	
35–44	11 037 (16.9)	6.6	4.9 to 8.2	4 056 (15.0)	2.4	1.6 to 3.2		6 556 (17.7)	3.9	2.5 to 5.3	
45+	10 112 (15.5)	3.0	2.3 to 3.7	6 193 (22.9)	1.8	1.2 to 2.4		3 859 (10.4)	1.1	0.7 to 1.5	
Unspecified	18† (0.0)	—	—	0 (0)	—	—		18† (0.0)	—	—	
Total§	65 374 (100.0)	6.3	5.1 to 7.5	27 060 (100.0)	2.6	2.0 to 3.1		36 980 (100.0)	3.5	2.5 to 4.6	

CI = confidence interval.
*Excludes injuries sustained during military training.
†These rates may be unstable due to low sample size (less than 25 sample cases) and/or a coefficient of variation >28%.
‡This estimate has a negative lower bound on the 95% CI due to instability based on small sample size.
§Percentages may not sum to 100.0 due to rounding.

blast. Injuries caused by contact with an edged, pointed, or sharp part of the gun or by being pinched between moving parts of the gun were labeled "cut/crush" injuries. Mechanisms of injury classified in the "other" category include injuries caused by falls, burns, mechanical force, acoustic energy, and other less frequent mechanisms. Activity-at-time-of-injury categories were mutually exclusive. If more than one activity was reported, the case was assigned the category listed first in the narrative.

National estimates of the number of injuries, injury rates, and 95% confidence intervals are presented. Injury rates per 100 000 population were annualized and calculated by using 1993–96 postcensal population estimates from the United States Bureau of Census.[25] Confidence intervals for numbers and rates and relative standard error (SE) or coefficients of variation were computed by using a program that accounts for the stratified sample design and sample weights.[20] National estimates based on weighted data for fewer than 25 cases or that had a relative SE (or coefficient of variation) more than 28% are unreliable and are footnoted in tables. This work was exempt from institutional review board approval.

Results

During the study period, an estimated 413 186 non-fatal firearm injuries were treated in emergency departments in the United States (fig 1). Of these injuries, 84.2% (347 615) were attributed to GSWs and 15.8% (65 374) were associated with firearm related non-GSWs. GSWs were predominantly violence related (70%), including assault, legal intervention, and suicide attempts.

Table 1 shows the majority of the non-GSWs were assaults (56.6%; 36 980 injuries) and unintentional injuries (41.4%; 27 060 injuries). The rate for males was 4.3 times that for females. This difference was consistent for unintentional injuries and assaults. With regard to race/ethnicity categories, black people had the highest rate for assaults while non-Hispanic whites had the highest rate for unintentional injuries. The non-GSW rate was highest among persons 15–24 years old.

The nature of injury and characteristics of the injury incident for those with non-GSWs appear in table 2. The primary body part

Table 2 National estimates of civilian non-fatal firearm related injuries* other than gunshot wounds treated in hospital emergency departments, by selected characteristics and injury intent: United States, 1993–96

| | | Intent of injury | |
| | Total | Unintentional | Assault |
Characteristic	No (%)	No (%)	No (%)
Primary body part affected			
Face/head/neck	43 841 (67.1)	13 697 (50.6)	29 501 (79.8)
Eye	2 385 (3.6)	1 602† (5.9)	559† (1.5)
Hand/arm/shoulder	10 871 (16.6)	8 929 (33.0)	1 742 (4.7)
Trunk	4 475 (6.8)	1 524 (5.6)	2 761 (7.5)
Foot/leg	2 003 (3.1)	1 084† (4.0)	885 (2.4)
Other	1 603 (2.5)	224† (0.8)	1 336† (3.6)
Unknown	196† (0.3)	0 (0)	196† (0.5)
Diagnosis			
Laceration	35 582 (54.4)	17 018 (62.9)	18 113 (49.0)
Contusion/abrasion	12 143 (18.6)	3 515 (13.0)	8 212 (22.2)
Fracture	3 833 (5.9)	1 387 (5.1)	2 367 (6.4)
Internal organ injury	2 945 (4.5)	183† (0.7)	2 745 (7.4)
Other	10 837 (16.6)	4 957 (18.3)	5 509 (14.9)
Unspecified	34† (0.1)	0 (0)	34† (0.1)
Disposition			
Treated/released	63 245 (96.7)	26 723 (98.8)	35 205 (95.2)
Hospitalized	1 897 (2.9)	337† (1.2)	1 543 (4.2)
Unknown	232† (0.4)	0 (0)	232† (0.6)
Location			
Home/apartment/condominium	14 731 (22.5)	6 996 (25.9)	7 379 (20.0)
School/recreation	3 560 (5.4)	3 223 (11.9)	292† (0.8)
Street/highway	6 740 (10.3)	437† (1.6)	6 224 (16.8)
Other property	9 066 (13.9)	3 735 (13.8)	5 078 (13.7)
Unknown	31 277 (47.8)	12 669 (46.8)	18 007 (48.7)
Firearm type			
Handgun	22 529 (34.5)	3 349 (12.4)	18 785 (50.8)
Rifle	11 327 (17.3)	9 610 (35.5)	1 378 (3.7)
Shotgun	9 283 (14.2)	6 813 (25.2)	2 261 (6.1)
Unknown	22 235 (34.0)	7 288 (26.9)	14 556 (39.4)
Person causing injury			
Stranger	13 128 (20.1)	34† (0.1)	13 060 (35.3)
Self	25 021 (38.3)	24 862 (91.9)	37† (0.1)
Friend/acquaintance	4 267 (6.5)	376† (1.4)	3 857 (10.4)
Spouse/ex-spouse/relative	2 375 (3.6)	257† (0.9)	2 118 (5.7)
Other	2 272 (3.5)	317† (1.2)	1 201† (3.2)
Unknown	18 311 (28.0)	1 214 (4.5)	16 707 (45.2)
Total‡	65 374 (100.0)	27 060 (100.0)	36 980 (100.0)

*Excludes injuries sustained during military training.
†These estimates may be unstable due to low sample size (less than 25 sample cases) and/or a coefficient of variation >28%.
‡Percentages may not sum to 100.0 because of rounding.

Table 3 *National estimates of non-fatal firearm related injuries* other than gunshot wounds treated in hospital emergency departments, by activity at time of injury, injury mechanism, and injury intent: United States, 1993–96*

Characteristic	Total No (%)	Intent of injury	
		Unintentional No (%)	Assault No (%)
Activity at time of injury			
Routine gun use†	14 996 (22.9)	14 825 (54.8)	77‡ (0.2)
Recreation	6 969 (10.7)	6 871 (25.4)	17‡ (0.0)
Work	3 468 (5.3)	1 651 (6.1)	1 749 (4.7)
Travel	3 680 (5.6)	425‡ (1.6)	3 221 (8.7)
Vital activity†	3 016 (4.6)	417‡ (1.5)	2 565 (6.9)
Leisure	2 063 (3.2)	335‡ (1.2)	1 694 (4.6)
Other	355‡ (0.5)	253‡ (0.9)	102‡ (0.3)
Unspecified	30 827 (47.2)	2 283 (8.4)	27 555 (74.5)
Mechanism of injury			
Struck by or against			
Hit by moving gun	34 847 (53.3)	3 593 (13.3)	30 521 (82.5)
Hit by gun recoil	11 729 (17.9)	11 686 (43.2)	0 (0)
Other	2 670 (4.1)	1 086‡ (4.0)	1 507 (4.1)
Cut/pierce/crush/pinch			
Slide/trigger mechanism	1 269‡ (1.9)	1 269‡ (4.7)	0 (0)
Flying glass	1 203 (1.8)	77‡ (0.3)	1 092‡ (3.0)
Other	4 848 (7.4)	4 215 (15.6)	546‡ (1.5)
Mechanical force/explosion	1 624 (2.5)	1 624 (6.0)	0 (0)
Other	6 750 (10.3)	3 362 (12.4)	3 062 (8.3)
Unspecified	434‡ (0.7)	148‡ (0.5)	252 (0.7)
Total§	65 374 (100.0)	27 060 (100.0)	36 980 (100.0)

*Excludes injuries sustained during military training.
†Routine gun use includes cleaning, repairing, loading/unloading or transporting a firearm; vital activities include eating and sleeping.
‡These estimates may be unstable due to low sample size (less than 25 sample cases) and/or a coefficient of variation >28%.
§Percentages may not sum to 100.0 due to rounding.

affected was the head, face, and neck region. Four out of five of the assault injuries were to the head, face, or neck. The majority of injuries treated were lacerations. However, lacerations accounted for a higher percentage of unintentional than assault related injuries (63% *v* 49%, p<0.0001, respectively). Contusions and abrasions accounted for a higher percentage of assault related than unintentional injuries (22.2% *v* 13.0%, p<0.0001, respectively). About 3% (or 1897 injuries) of non-fatal, non-GSWs were severe enough to require hospitalization, of which 71% involved the head and neck region. The locale where the injury occurred was determined for only about half of the cases, most occurring in or around the home. The type of firearm used was unknown in more than a third of the cases; of the known firearm types, 34.5% were handguns. More than 60% of the unintentional injuries were associated with, or involved rifles and shotguns, while half of assault related injuries were associated with or involved handguns. The majority of unintentional injuries were self inflicted. The person causing the injury could not be determined in 45% of assault related cases; in cases with known perpetrators, injuries inflicted by a stranger was the most common.

The activity at time of injury and mechanism of injury are described in table 3. Activity was determined for over 90% of unintentional injury cases but only for about 25% of assault related cases. More than half of unintentional injuries occurred during cleaning, repairing, loading/unloading, or transporting a firearm and an additional one fourth occurred during recreational activities, such as hunting and target shooting. For those assault related cases with known activity, about 20% occurred while the victim was engaged in vital, travel, or leisure activities. For example, some were inadvert-

ently caught in the line of gunfire and were struck by ricocheting debris or broken glass; others fell down while attempting to evade gunfire.

The mechanism of injury was determined in most cases. For assaults, the predominant mechanism was being struck by a moving gun, frequently called a pistol whipping (82.5%; 30 521 injuries). For unintentional injuries, the most common mechanism was gun recoil (43.2%; 11 686 injuries), followed by cutting, piercing, crushing, and pinching injuries associated with the slide or trigger mechanism or other gun part. Six per cent of unintentional injuries resulted from mechanical force related to an explosion of gun parts. Other unintentional injuries included powder burns, burns from contact with hot shell casings, auditory trauma from excessive noise exposure, and falls while carrying a firearm.

Over the four year study period, 6871 persons with recreational non-GSWs were treated in hospital emergency departments in the United States (table 4). Persons treated for these injuries were primarily male and over 15 years of age. Nearly two thirds of the injuries were to the head, face, neck and eye, and most of the others were to the extremities. Rifles and shotguns accounted for nearly two thirds of these injuries. Recreational non-GSWs were primarily associated with hunting (55.2%; 3792 injuries) and target shooting (44.3%; 3043 injuries). Almost half of the recreational injuries (3209 injuries) were caused by gun recoil, and nearly eight out of 10 occurred during the fall and winter.

Table 4 *National estimates of civilian non-fatal firearm related injuries* other than gunshot wounds occurring during recreational activities and treated in hospital emergency departments, by selected characteristics: United States, 1993–96*

Characteristic	No (%)
Sex	
Male	6031 (87.8)
Female	840† (12.2)
Age	
0–14	680† (9.9)
15–34	3005 (43.7)
35+	3186 (46.4)
Primary body part affected	
Head/face/neck/eye	4205 (61.2)
Limb	2193 (31.9)
Other	473† (6.9)
Firearm type	
Handgun	953† (13.9)
Rifle	2282 (33.2)
Shotgun	1920 (27.9)
Unknown	1716† (25.0)
Activity at time of injury	
Hunting	3792 (55.2)
Target shooting	3043 (44.3)
Other	36† (0.5)
Mechanism of injury	
Hit by gun recoil	3209 (46.7)
Other	3662 (53.3)
Season‡	
Fall/winter	5332 (77.6)
Spring/summer	1539 (22.4)
Total§	6871 (100.0)

*Excludes injuries sustained during military training.
†These estimates may be unstable due to low sample size (less than 25 sample cases) and/or a coefficient of variation >28%.
‡Season is defined as fall (21 September to 20 December), winter (21 December to 20 March), spring (21 March to 20 June), and summer (21 June to 20 September).
§Percentages may not sum to 100.0 due to rounding.

Discussion

To our knowledge, this report provides the first national estimates of non-fatal, non-GSWs treated in hospital emergency departments pertaining to non-military, civilian life. During the four year period 1993 through 1996, we estimated that 16 344 non-fatal, non-GSWs were treated in American emergency departments annually. During this same period, an estimated 86 904 non-fatal GSWs were treated each year in the same hospitals. In addition, an average of 37 024 persons were killed by GSWs annually from 1993 through 1996.[4] These data show that non-fatal, non-GSWs contribute markedly to the total numbers of firearm related injuries in the United States each year.

Population subgroups at highest risk for sustaining non-fatal, non-GSWs are very similar to those at highest risk for fatal and non-fatal GSWs injuries. The non-fatal and fatal firearm related injury rates for males is about six to seven times higher than that for females.[2–8] Our results show that the rate of non-fatal, non-GSWs for males was more than four times that for females. The age distribution for non-fatal, non-GSWs also follows the distribution of fatal and non-fatal GSWs. People aged 15–34 years account for the largest number of firearm related injuries and deaths, over 70% of non-fatal GSWs and 47.5% of fatal GSWs.[4 5] In our study, 60% of the non-fatal, non-GSWs were among persons 15–34 years old.

Regarding racial and ethnic disparity, our results suggest that the racial disparity among non-fatal and fatal GSW injuries extends to non-fatal, non-GSWs injuries. The rate of non-fatal, non-GSWs among black people was approximately three times the rate for non-Hispanic whites. In 1996, the fatal firearm related injury rate for the black population was 2.7 times that of the white population.[4] Annest *et al* reported that the non-fatal GSW rate among blacks was over nine times the rate among non-Hispanic whites and three times the rate among Hispanics.[5] Our estimates show that among assault related non-GSW injuries for blacks, the rate was eight times the rate for non-Hispanic whites.

Implications for prevention

In this study, national estimates indicate that 97% of non-fatal, non-GSWs treated in hospital emergency departments in the United States during the study period were not hospitalized. However, non-GSWs, such as struck by a gun in the head, that are not severe enough to require hospitalization may result in permanent or residual disability.[26 27] Mild traumatic brain injuries may lead to long term, potentially permanent residual symptoms such as headaches, irritability, anxiety, dizziness, fatigue, impaired concentration, memory loss, and information processing deficits.[28–35] Almost 2400 non-GSW related eye injuries were treated in hospital emergency departments over the four year study period. Sixty seven per cent of these injuries were unintentional, most of which occurred during routine gun handling (63.7%) or recreational (26%) activities. Fire-arm related eye injuries, including corneal abrasions, lacerations, orbital lacerations, and enucleation are often severe enough to require surgery and may result in permanent visual acuity loss.[13 36–39] These injuries might be prevented through proper use of safety glasses and proper gun handling techniques. Even though head, face, and eye injuries may result in significant disability, no mechanism currently exists to monitor firearm related injury disability nationally.[40]

Recreational gun users need to understand their risk of non-GSWs during gun use. Non-GSWs severe enough to require emergency medical attention can occur, including lacerations, contusions/abrasions, and fractures. Almost 92% of unintentional non-fatal, non-GSWs were self inflicted. A majority (55%) of unintentional non-fatal, non-GSWs occurred during activities such as cleaning, repairing, and handling firearms. These activities have also been associated with unintentional GSWs.[9] Twenty five per cent of an estimated 6871 unintentional injuries occurred during recreational gun use, including hunting (55.2%) and target shooting (44.3%). For cases where the type of firearm was known, rifles (33.2%) and shotguns (27.9%) were the most frequent type of firearm responsible for unintentional recreational injuries. This finding is consistent with other reports of hunting related injuries and deaths.[9 17]

Self inflicted recreational firearm injuries have high potential for prevention. Gun safety and firearm education programs should be directed towards recreational gun users, including hunters and target shooters. In this study, just over three quarters of recreational non-GSWs occurred during the fall. Emphasizing firearm safety messages during the late summer and early fall may remind hunters and target shooters to be cautious when engaging in gun related activities.

Among recreational non-GSWs, 43% were caused by gun recoil. Instructing novice gun users in the proper positioning of the gun stock on the shoulder can help to control the powerful "kickback" associated with discharge of a firearm thereby limiting recoil related injuries. Improving firearm design, such as incorporating cushioned gun stocks or padded shoulder holsters, may also help reduce recoil related injuries. Designing rifle scopes with padded and rounded edges could decrease chance of lacerations around the eye.

LIMITATIONS

We estimated that 7630 persons purposely struck by a gun were treated in American hospital emergency departments annually. This estimate is half the estimate of 15 300 reported by Rand in a study of all intentional injuries in 1994.[8] The difference in these estimates could be explained by two factors. First, his estimate of being struck by a gun has a large sampling error due to the small numbers of cases reported in the study conducted at one third of the 91 NEISS hospitals. Second, it is possible that his coding scheme was more inclusive in defining struck by a gun. Both studies,

however, indicate that those involved in policy decisions and planning programs for gun related violence prevention should be informed not only about GSWs but also about the extent of injuries from being struck by a gun.

NEISS is only appropriate for calculating national estimates of firearm related injuries and cannot be used to examine associations with geographic location and urbanization. Also, NEISS data on injury related circumstances are abstracted from emergency department records. Since medical personnel primarily are focused on treating the patient, medical records often lack sufficient information to describe injury related circumstances. For instance, guns are used in about 30% of weapon related assaults.[41] We were only able to classify the context (for example, robbery, burglary, sexual assault) in 38.3% of assaults. Also, we had difficulty identifying the locale of the assault related incident (48% unknown), the type of firearm (34% unknown), the victim-offender relationship (45% unknown) and activity at the time of injury (74% unknown). To improve reporting of these characteristics, NEISS data could be linked to other data sources. Law enforcement and medical examiner/coroner reports have been identified as providing the most comprehensive incident information on firearm fatalities; law enforcement and crime lab reports could be a potential information source for investigating non-fatal firearm injuries.[42 43]

NEISS collects data on firearm related injuries treated in hospital emergency departments. As a result, this report may underestimate the number of non-fatal, non-GSWs because common types of non-GSWs, such as contusions, lacerations and burns, may have been treated in medical facilities other than hospital emergency departments or may not have required treatment by a medical professional. NEISS does provide a sensitive estimate of the number of non-fatal firearm injuries.[19] An evaluation of NEISS found that hospital coders correctly identified 92.4% of GSWs treated in a random sample of NEISS hospital emergency departments.[18] Although non-GSWs were not included in that evaluation study, coders were instructed to report all gun related incidents described in the emergency department record. We have no reason to suspect NEISS is any less sensitive for non-GSWs.

In summary, non-fatal, non-GSWs make an important contribution to the overall public health burden of fatal and non-fatal firearm related injuries in the United States and affect blacks disproportionately. Over half (58%) of such injuries were violence related. Injuries from being purposely struck by a gun should be considered when developing gun violence prevention programs at national, state, and local levels. Most of the remaining non-fatal, non-GSWs were unintentional (41.4%), which were predominantly self inflicted (92%) and preventable. Further research is needed to identify and characterize gun users at greatest risk of sustaining these types of injuries and to examine associations between injury events and firearm design and safety features. Efforts should

be made in state and local jurisdictions to design effective prevention strategies and to facilitate the availability of proper training and education in gun handling and gun safety practices for all gun owners and users to decrease the risk of injury.

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Million Mom March

In May approximately 750 000 moms (and many dads and others) marched to Washington to press for sensible gun laws in the US. This was an impressive event and in spite of some trivial counter demonstrations ("I am here to protect my God-given right to carry a gun", said one opponent), may well have succeeded in getting the message across to the US Congress that the time for fundamental changes had come.

Rational research spending?

Last year, an important report appeared in a leading international journal demonstrating that "The amount of . . . funding for research on a disease is associated with the burden of the disease; however, different measures of the burden . . . may yield different conclusions about the appropriateness of disease-specific funding levels". Indeed, they do. An inspection of the data reveals that injury is perhaps the most underfunded of all and that various, "popular" diseases—for example, AIDS, breast cancer, diabetes, and dementia are clearly over-funded (*N Engl J Med* 1999;**340**:1881–7).
Editor's note: My apologies if I previously brought this report to our readers' attention.

"Accident" again!

In a book about an American couple (*Native Speaker*, by Chang-Rae Lee), whose son was fatally injured, the author writes this bit of dialogue: "It was a terrible accident". The other retorts, "An accident? . . .. How can you say it was an accident? We haven't treated it like one. Not for a second. Look at us, Sweetie, can't you see, when your baby dies it's never an accident. I don't care if a truck hit him or he crawled out a window or he put a live wire in his mouth, it was not an accident. And that's a word you and I have no business using" (p 120).
Editor's note: Thanks to Elisa Braver for bringing this to my attention.

Pro-car, antipedestrian rhetoric in the UK

A piece appeared in the *Times* (London) last fall that I dismissed after first reading it because I assumed it was tongue-in-cheek, facetious. I then concluded that the writer, Jonathan Meades, was perfectly serious. His extended tirade against the safety of pedestrians and preference for protecting the needs of motorists is summed up well by the following opening quotes: "Our cities are being killed by pedestrian zones which benefit only tourists and criminals". "If God had meant us to walk he wouldn't have allowed us to invent the wheel". I hesitated to report this, but think we need to appreciate what we are up against in our efforts to prevent pedestrian injuries.

Asbestos-containing crayons

Health Canada is inspecting crayons for asbestos after tests in the US found small amounts of this carcinogen in three brands, including the most popular. Although the manufacturer disputes the findings, Health Canada will conduct its own tests as a "precautionary" measure.